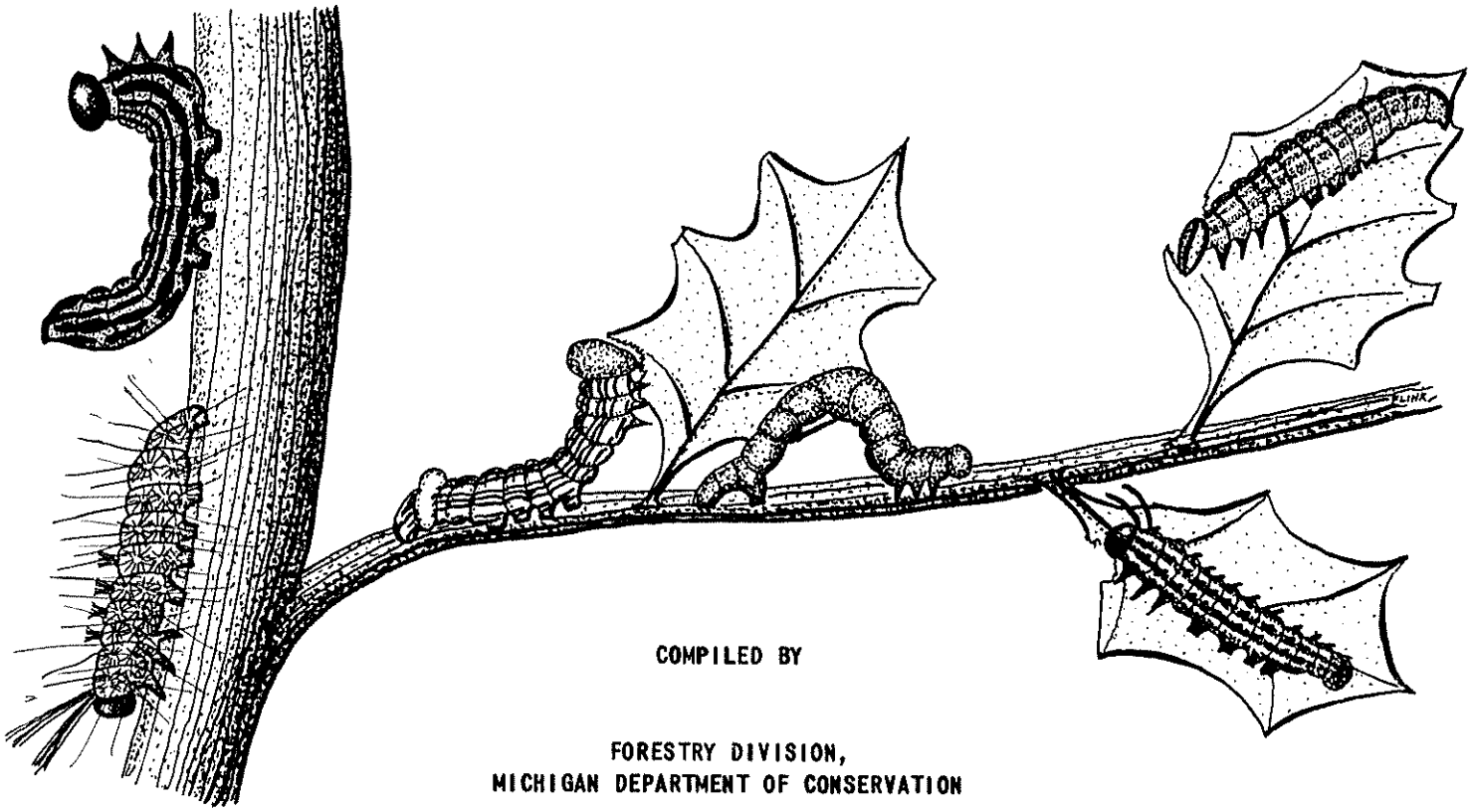
MICHIGAN

FOREST PEST DETECTION PROGRAM

REPORT FOR 1957



COMPILED BY

FORESTRY DIVISION,
MICHIGAN DEPARTMENT OF CONSERVATION

COOPERATORS

DIVISION OF FOREST INSECT RESEARCH, LAKE STATES FOREST EXPERIMENT STATION

DIVISION OF PLANT INDUSTRY, STATE DEPARTMENT OF AGRICULTURE

DEPARTMENTS OF ENTOMOLOGY, BOTANY AND PLANT PATHOLOGY,
FORESTRY EXTENSION SERVICE, MICHIGAN STATE UNIVERSITY

SCHOOL OF NATURAL RESOURCES, UNIVERSITY OF MICHIGAN

UNITED STATES FOREST SERVICE

PRIVATE FOREST INDUSTRY

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INTRODUCTION

The Michigan Forest Pest Detection Program functions through the cooperation of many individuals, public agencies and private companies. Greatly increased interest in the problems of forest insects and diseases in the past few years, coupled with a reasonable and coordinated approach, have kept the program moving forward on an even keel to a point where it is making an increasingly valuable contribution to the welfare of the forests of the state.

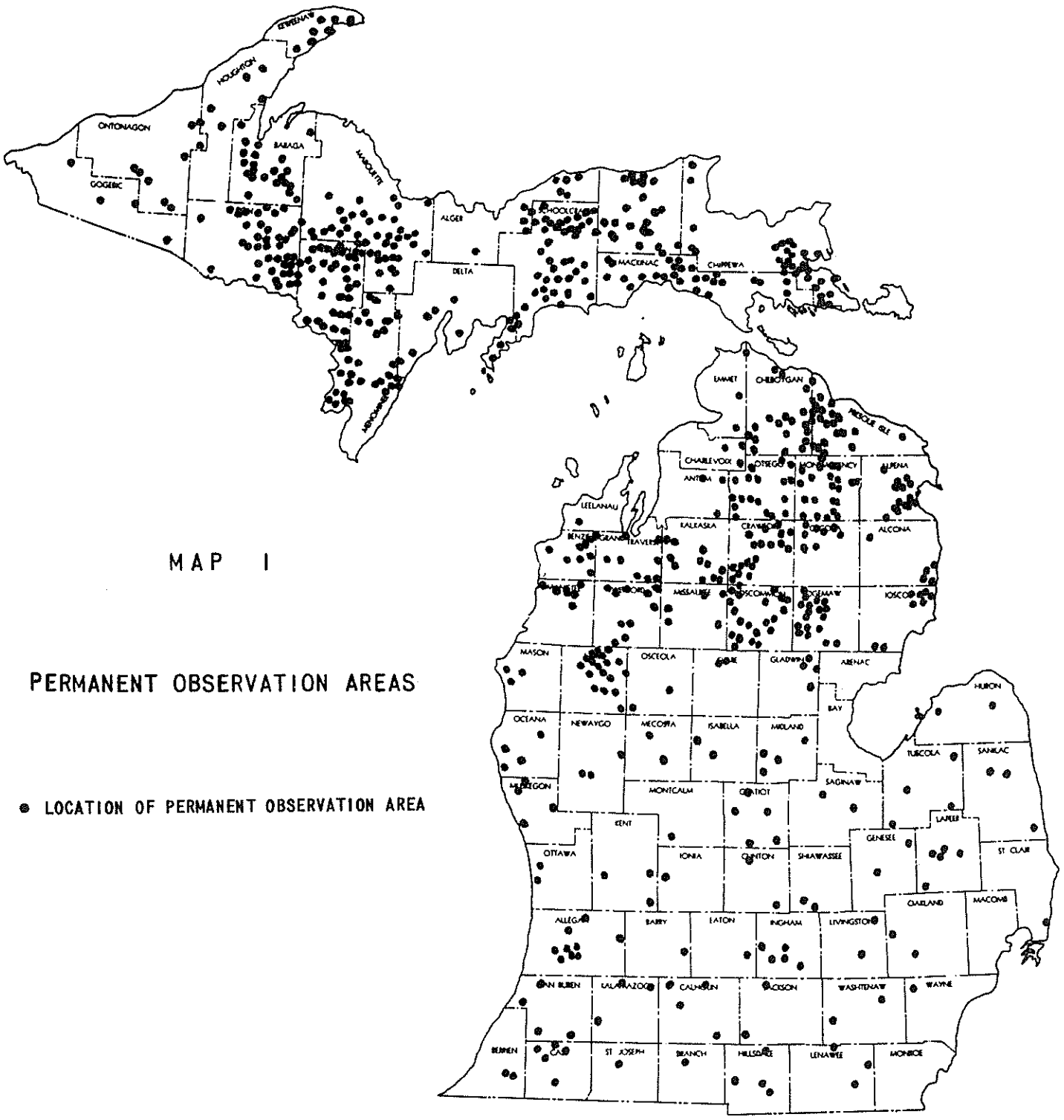
Cooperation with neighboring states in regional activities is an important part of the program. The seventh Annual Lakes States Forest Insect Survey Conference was held in Minneapolis in February with representatives of federal, state and private agencies participating. The major problem confronting this group is the standardization and coordination of survey techniques and activities in Minnesota, Wisconsin and Michigan. To this end, standardized survey techniques have been approved for the spruce budworm, larch sawfly, forest tent caterpillar, Saratoga spittlebug, jack pine budworm, pine tortoise scale, and the red-headed pine sawfly.

Close coordination between corresponding agencies in the Great Lakes region has been possible through the formation of the Central International Forest Insect and Disease Conference. At this conference, entomologists, pathologists and foresters from the three Lake States and adjoining Canadian Provinces are able to discuss mutual forest pest problems and present research findings. The sixth meeting of this conference was held in October at Winnipeg, Manitoba.

On December 19 the annual meeting of the Michigan Forest Pest Detection Program committee was held in Lansing to review the work carried on during the year by the various agencies concerned with surveys, control and research; to discuss the annual report, and to make plans for 1958, particularly in regard to possible control projects. Those in attendance were: U. M. Martilla, J. K. Kroeber, J. B. Cody, S. A. Graham, W. S. Cath, W. J. Young, P. R. Flink, N. F. Smith, D. F. Lovitt, J. W. Butcher, F. C. Strong, L. E. Bell, T. D. Stevens, D. C. Schmiege, and W. E. Miller.

The following report of the activities of the Michigan Forest Pest Detection Program during 1957 was prepared by the Forestry Division of the Michigan Department of Conservation.

* * *



MAP I

PERMANENT OBSERVATION AREAS

● LOCATION OF PERMANENT OBSERVATION AREA

ORGANIZATION OF PROGRAM

Increasing awareness and concern about losses caused by insects and diseases to the forests of Michigan led to the beginning of a forest pest detection program in 1950. The program was outlined and organized by the Conservation Department with the cooperation of the U. S. Bureau of Entomology and Plant Quarantine (now the Division of Forest Insect Research, U. S. Forest Service), the U. S. Forest Service, The University of Michigan, Michigan State University, and the State Department of Agriculture.

The program involves more than the mere detection of forest pest outbreaks, its objectives being: (1) to detect the presence of forest insects and diseases, and to apprehend outbreaks by systematically and annually collecting records of occurrence and damage; (2) to facilitate and organize direct control in case of emergency; and (3) to provide a basis for protective measures by indirect means.

The detection framework is built principally around the field organization of the Forestry Division of the Conservation Department, which handles state and private lands and the U. S. Forest Service which handles federal lands. The general field plan for insects insofar as the State Forestry Division districts are concerned, calls for the establishment of permanent observation areas scattered throughout each forest district on both state and private lands in timber stands where critical insects exist or are likely to appear. (See Map I). Observation reports are submitted annually to the Lansing office of the division, indicating the degree of infestation, or the absence, of each of the critical insects on the designated plots. Those critical insects found only in the southern part of the state are not reported on in the northern regions, and vice versa. Thus, each district forester has only six to eight critical insects to observe.

The two educational institutions participate in training programs and act in an advisory capacity on insect and disease identification and control measures, as does also the Division of Forest Insect Research of the U. S. Forest Service.

The State Department of Agriculture, through its Division of Plant Industry, is directly concerned in the program by virtue of its statutory authority to establish quarantines, to enter on private lands for purposes of inspection, and, where necessary, to compel or provide for the control of serious insect pests and contagious plant diseases.

The disease phase of the program does not follow the same routine as applied to insects, since there are relatively few "critical" forest diseases requiring constant surveillance. Individual programs have been developed for the important diseases with various state and federal agencies cooperating in survey and control work.

* * *

PROGRAM ACTIVITIES

PEST INFORMATION SHEETS

During 1956 and 1957, the Conservation Department prepared and distributed forest pest information leaflets on 13 insects. Pests now covered are white pine weevil, European pine sawfly, European pine shoot moth, Saratoga spittlebug, red-headed pine sawfly, anomala beetle, larch sawfly, mites or red spiders, jack pine budworm, spruce budworm, forest tent caterpillar, eastern spruce gall aphid, and eastern tent caterpillar.

The single page leaflets were prepared to fill a growing need, emphasized by the Lower Peninsula Forest Research Council and other agencies for a simple, inexpensive, handout sheet. Basic information and sketches are prepared by Paul R. Flink, Forestry Division entomologist, and all material is approved and agreed upon by the agencies cooperating in the Pest Detection Program. The leaflets can be readily changed and reprinted as changes in control recommendations or other information warrant.

The leaflets provide cooperators with a ready reference for life cycle, insect and injury descriptions, and control information. In addition, they are available for distribution to plantation owners, tree farmers and others. As of January 1, 1958, a total of over 23,000 leaflets have been distributed.

Leaflets on part or all of the following pests are contemplated for preparation during 1958: pine tortoise scale, pine spittlebug, walkingstick, larch casebearer, Zimmerman pine moth, wooly aphid, general hardwood defoliators, pine needle rust, eastern gall rust, pine needle rust, and pine sawyer beetles.

SPECIAL REPORTS

In addition to the routine requests for insect observation reports, seven special reports, usually in the form of general memorandums, were issued throughout the year whenever it was advisable to alert the cooperators to unusual conditions, time for control application, or other important information.

The mid-summer report was distributed in late July summarizing, insofar as possible, the forest insect situation in Michigan during the early summer. This report was designed to help keep the men in the field posted on the status of the critical insects and aware of potential pests for which they should be looking.

TRAINING SESSIONS

There were no special training sessions held during 1957 for the cooperators. Four training sessions were held in 1956 and a similar number is scheduled for 1958. These sessions are designed to enable the cooperators to more accurately report on insect conditions, to be better qualified to answer questions they are asked, and to better judge the potentialities of insect infestations.

Programs on tree pests were participated in by the Forestry Division entomologist at twelve tree growers meetings. Participation in these programs was requested by county agricultural agents; Extension Service, Michigan State University; Conservation Department district foresters; and Soil Conservation Service personnel. These programs were designed to acquaint tree growers with the tree pests in their area and the means of combatting them.

DISPLAY MOUNTS

Following requests by district foresters, 184 display mounts of 9 important insects were prepared and distributed in 1957. Specimens of the various stages of the insects life cycle and damage caused were used to make the 5 x 6 inch mounts. These display mounts are used as a refresher on the important insects and for demonstration purposes.

DIRECTORY OF FOREST TREE SPRAYING OPERATORS

In April a Directory of Forest Tree Spraying Operators was compiled and published for the purpose of supplying a list of available spraying services to tree farmers and others desiring to have their trees protected by commercial operators.

COOPERATIVE REPORTS

The pest detection program provides information for other cooperative reports as follows:

Cooperative Economic Insect Report -- Information on insect infestations and seasonal development is sent to Professor Ray Huson, Department of Entomology, Michigan State University, who forwards it to the Plant Pest Control Division, Agricultural Service, U. S. Department of Agriculture, for inclusion in the Cooperative Economic Insect Report. This report is a weekly resumé of important insects in the United States and includes a section on forest insects.

The Forest Insect and Disease Situation in the Lake States -- Annually the forest pest situation in the Lake States is summarized by the Lake States Forest Experiment Station from information submitted by the states and also collected by the Station. The forest insect situation in Michigan as reported in the annual report of the Pest Detection Program is forwarded to the Station for inclusion in the Lake States report.

A Status Report of Forest Insect Conditions -- The information compiled in the previously mentioned report by the Lake States Forest Experiment Station is included in the Status Report of Forest Insect Conditions covering the United States and published annually by the Division of Forest Insect Research, Forest Service, U. S. Department of Agriculture in Washington, D. C.

* * *

SPECIAL SURVEYS

Most of the young plantation in the northwestern Lower Peninsula were surveyed to determine the extent of red-headed pine sawfly, white pine weevil, and European pine shoot moth infestations, although the greatly increased populations of the red-headed pine sawflies necessitated spending the major portion of special survey time on this pest, at least insofar as Conservation Department activities were concerned. These surveys were carried on by district and assistant district foresters, forestry aides and the forest entomologist.

Airplanes were used to map the defoliation caused by the fruit tree leaf roller and the red-humped oakworm.

RED-HEADED PINE SAWFLY

Pre-control egg surveys for the red-headed pine sawfly were made on 1,358 acres of state forest in Antrim County in July. The percent of trees attacked in different parts of the area varied from 4 to 92 percent. As all stands were either heavily enough infested to warrant control or adjacent to heavily infested plantations, all plantations surveyed were included in the control plan.

In August a total of 4,742 acres was surveyed to determine the scope of the red-headed pine sawfly infestation in plantations established between 1949 and 1954 on the Hardwood, Pigeon River and Fife Lake state forests. Some sawfly colonies were found in all plantations. Table I summarizes the results of the survey.

TABLE I

RED-HEADED PINE SAWFLY INFESTATIONS

Degree of Infestation	Acres Infested	Percent of Area
0 - 1%	760 acres	10%
1 - 5%	1,471 acres	40%
6 - 20%	1,068 acres	29%
21 - 40%	257 acres	7%
41 - 60%	163 acres	4%

RED-HUMPED OAKWORM

During September aerial and ground surveys were made of the red-humped oakworm defoliation in west central Lower Peninsula. Widespread noticeable defoliation was mapped on 1,280 acres in Oceana County, 6,400 acres in Lake County, 16,960 acres in Newaygo County and 20,160 acres in Muskegon County. (See Map II).

FRUIT TREE LEAF ROLLER

On July 12 the fruit tree leaf roller infestation centering in Crawford County was surveyed from the air. The oak on an area of 349,440 acres showed noticeable defoliation. (See Map II.)

WHITE PINE WEEVIL

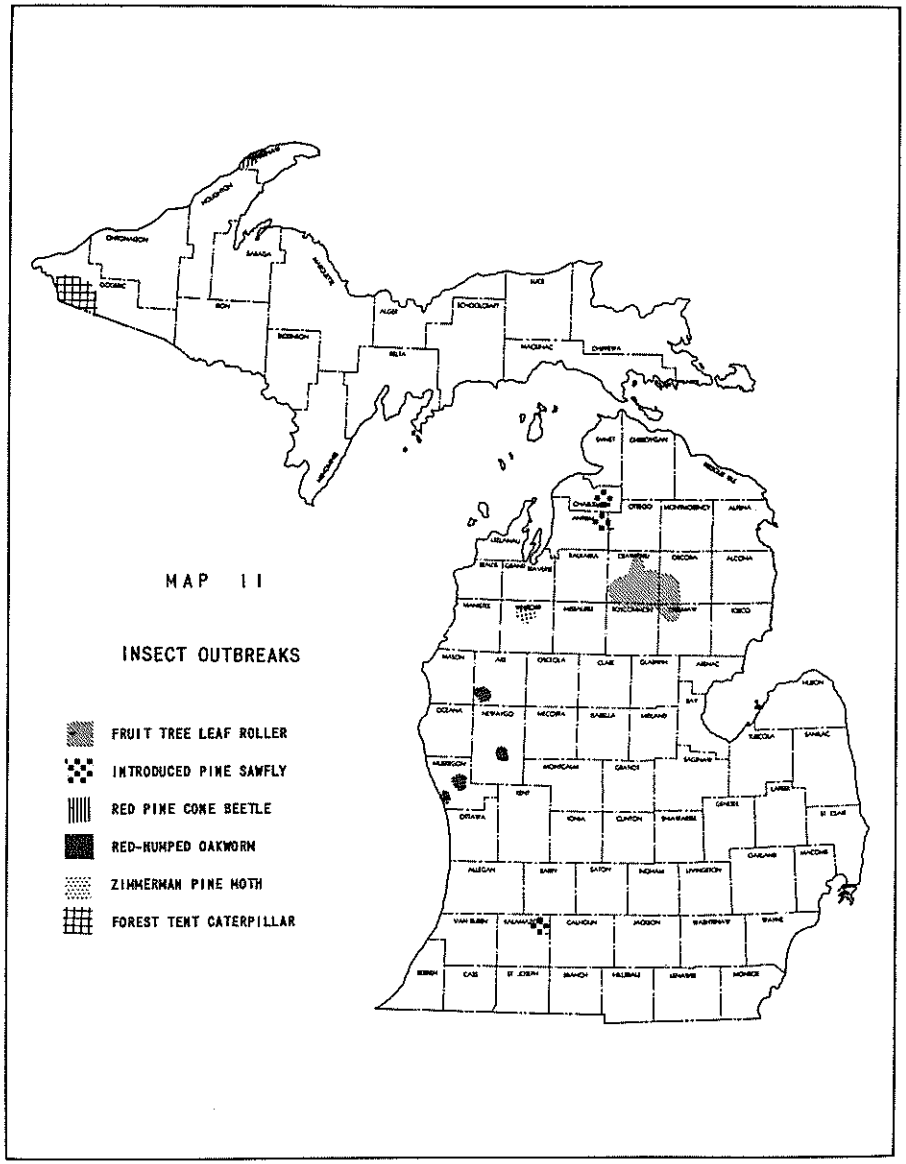
The degree of infestation of the white pine weevil on jack pine was tallied at the time of the red-headed pine sawfly survey. The percent of jack pine trees injured by the weevil in 1957 in the plantations surveyed on the Hardwood, Pigeon River and Fife Lake forests is shown in Table II.

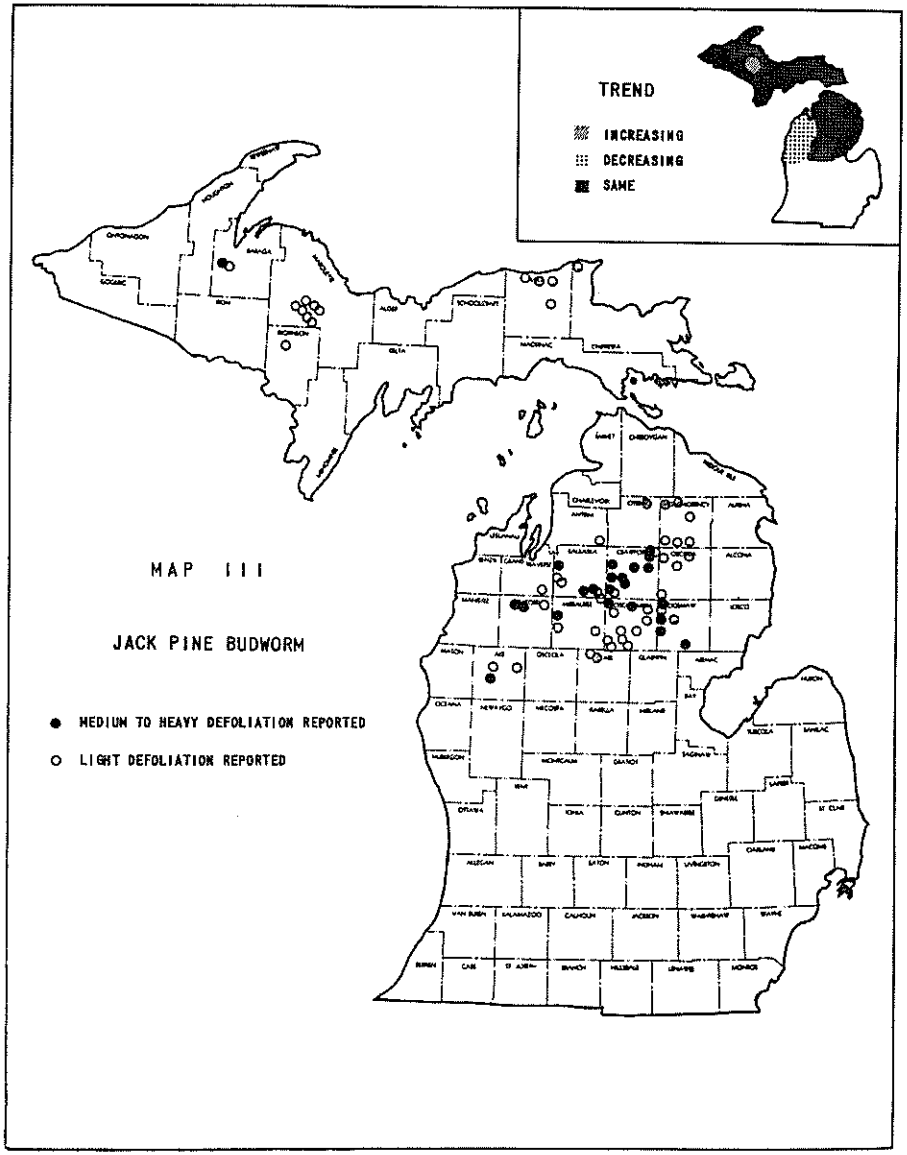
TABLE II

WHITE PINE WEEVIL INJURY IN 5 TO 9 YEAR OLD JACK PINE

Degree of Infestation	Acres Infested	Percent of Area
0	10	0%
1 - 10	2,764	37%
11 - 30	2,791	37%
31 - 50	1,430	19%
51 - 70	352	5%
71 - 90	171	2%

Weeviling of 1 to 5 percent red pine was found on 496 acres and 6 to 10 percent on 70 acres.


MAP II
INSECT OUTBREAKS
FRUIT TREE LEAF ROLLER
INTRODUCED PINE SAWFLY
RED PINE CONE BEETLE
RED-HUMPED OAKWORM
ZIMMERMAN PINE MOTH
FOREST TENT CATERPILLAR


TREND
INCREASING
DECREASING
SAME
MAP III
JACK PINE BUDWORM
MEDIUM TO HEAVY DEFOLIATION REPORTED
LIGHT DEFOLIATION REPORTED

CONTROL PROJECTS

Control projects on state land in 1957 were directed against the red-headed pine sawfly, white pine weevil and European pine shoot moth, and on U. S. Forest Service land against the red-headed pine sawfly, European pine shoot moth and Saratoga spittlebug. On private land, control was mainly directed toward the white pine weevil, European pine shoot moth, anomala beetle and pine sawflies in Christmas tree plantations. An area of approximately 19,840 acres was sprayed for gypsy moth control by the Michigan Department of Agriculture. Details of the gypsy moth spraying, as well as the oak wilt and Dutch elm disease control programs, are given under the sections on "Other Important Insects," and "Diseases".

WHITE PINE WEEVIL

On the Fife Lake State Forest prison inmate labor was used for clipping and burning weevil infested tops on 56 acres in Grand Traverse County; 73 acres in Wexford County; and 124 acres in Manistee County. On the Houghton Lake State Forest 218 acres in Missaukee County were similarly treated.

RED-HEADED PINE SAWFLY

Aerial application of one pound of DDT per acre was used in southeastern Antrim County to spray 1,700 acres of red and jack pine infested with red-headed pine sawfly. The cost, including re-spraying of plantation edges, was $1.56 per acre for airplane and spray.

A hydraulic sprayer mounted on a power wagon was used to spray 52 acres of jack pine in Emmet County. Half of the area received 1.5 pounds of DDT in 75 gallons of water per acre and the rest received 1.7 pounds of DDT in 43 gallons of water per acre. The average cost of spraying was $6.58 per acre including all costs except equipment repair.

Inmates with hand sprayers sprayed individual sawfly colonies on 73 acres in Wexford County, 124 acres in Manistee County, and 218 acres in Missaukee County.

The U. S. Forest Service sprayed 236 acres on the Upper Michigan National Forest for control of this pest.

EUROPEAN PINE SHOOT MOTH

Four types of control operations were tried against the European pine shoot moth on state land. A single application of DDT in early July was applied by the following methods: airplane, 40 acres in Leelanau County at the rate of 3 pounds of DDT in 3 gallons of oil per acre costing $5.00 per acre; mist blower, 37 acres in Wexford County at the rate of 1.2 pounds of DDT in 16 gallons of water per acre at a cost of $11.50 per acre; and hydraulic sprayer, 6 acres in Wexford County at the rate of 4.9 pounds of DDT in 67 gallons of water per acre at a cost of $11.50 per acre. None of these methods produced adequate control.

Hand clipping of infested buds in late May and early June by inmate crews shows promise in light infestations where the labor is available. This method of control was used on 50 acres in Manistee County.

The U. S. Forest Service sprayed 84 acres with DDT on the Lower Michigan National Forest.

SARATOGA SPITTLEBUG

On the Upper Michigan National Forest, 633 acres were sprayed for Saratoga spittlebug control by the U. S. Forest Service.

* * *

FOREST INDUSTRY COOPERATION

Industry foresters cooperate in the detection program by reporting on observation plots in areas not covered by state and federal foresters and thus help in presenting a better over-all picture of forest insect conditions in the state. In addition, industry foresters are called upon to assist in special surveys of concern to the companies.

The following companies, including six pulp and paper companies, four mining companies, and two power companies are now actively participating in the forest pest detection program.

Abitibi Corporation
American Box Board Company
Calumet and Hecla
Cleveland Cliffs Iron Company
Consolidated Water Power and Paper Company
Consumers Power Company
Copper Range Company
Escanaba Paper Company
Kimberly-Clark of Michigan, Inc.
Marathon Corporation
Oliver Mining Company
Wisconsin-Michigan Power Company

* * *

OBSERVATION REPORTS

OBSERVATION REPORTS

A total of 2,020 observation reports was received and analyzed by the Lansing office of the Forestry Division. This is approximately the same as the 1956 total. In addition to the regular observation reports, 41 letters were received with observation on other forest insect conditions.

The total number of permanent observation areas is now 689. This is a decrease from the 1956 total as a result of dropping of plots which were no longer suitable because of changed conditions, or for some other reason.

FOREST INSECT FIELD REPORT

Brief report forms on postal cards were distributed to all cooperators to facilitate reporting infestations or unusual conditions not covered by the regular observation reports. Twenty-five cards were received by the Lansing office, and provided supplementary information on insect conditions.

* * *

CRITICAL INSECTS

The list of critical insects in Michigan has been changed from time to time to include actively or potentially injurious forest insects and to remove from the list those which are no longer considered thus.

No additions or deletions were made in the critical insect list reported on in 1957 nor are any expected to be made in 1958.

JACK PINE BUDWORM - *Choristoneura pinus* Free.

Summary of Reports

	1951	1952	1953	1954	1955	1956	1957
Total.....	135	185	232	280	291	276	267
Percent Positive.....	38	40	32	20	20	29	22

Breakdown of 1957 Reports

Heavy defoliation (61-100%).....6.....(7.6%)
Medium defoliation (21-60%).....18.....(22.8%)
Light defoliation (1-20%).....55.....(69.6%)

Jack pine budworm larvae can be found in most jack pine stands in the Lower Peninsula and eastern end of the Upper Peninsula. New areas of light defoliation were reported in the central Upper Peninsula counties of Dickinson, Baraga and Marquette. Many stands in the central Lower Peninsula suffered from moderate to heavy feeding by the budworm larvae. Generally, the overall infestation remained about the same as in 1955 and 1956.

The population in the area heavily defoliated in 1953 and 1954 in northern Luce County remained very low. Elsewhere in the Upper Peninsula the population level appears to be increasing.

Moderate to heavy defoliation was reported in Baraga County in the Upper Peninsula and Crawford, Kalkaska, Wexford, Missaukee, Roscommon, Ogemaw and Lake counties in the Lower Peninsula. (See Map III).

RED-HEADED PINE SAWFLY - *Neodiprion lecontei* (Fitch)

Summary of Reports

	1951	1952	1953	1954	1955	1956	1957
Total.....	133	173	231	230	260	255	239
Percent Positive.....	18	7	8	8	5	5	16

Breakdown of 1957 Reports

Heavy defoliation.....(11-100% susceptible trees attacked).....4.....(10.3%)
Medium defoliation.....(2-10% susceptible trees attacked).....17.....(43.6%)
Light defoliation.....(0-1% susceptible trees attacked).....18.....(46.1%)

Red-headed pine sawfly populations increased greatly during 1957, particularly in western Upper Peninsula and northwestern Lower Peninsula. Infestations were reported in many areas where the previous reports had been negative. An increased population is expected next year indicating the probable necessity for more control programs.

Moderate to heavy infestations were reported in Baraga, Iron, Dickinson and Menominee counties in the Upper Peninsula and Emmet, Charlevoix, Antrim, Otsego, Kalkaska, Crawford, Manistee, Wexford and Lake counties in the Lower Peninsula. (See Map IV).

LARCH SAWFLY - *Pristiphora erichsonii* (Htg.)

Summary of Reports

	1951	1952	1953	1954	1955	1956	1957
Total.....	68	113	137	135	145	140	133
Percent Positive.....	0	30*	42	73*	66	81	85

* THE APPARENT INCREASE IS LARGELY DUE TO INTENSIFIED SURVEYS RATHER THAN BUILDUP OF INSECT POPULATIONS.

Breakdown of 1957 Reports

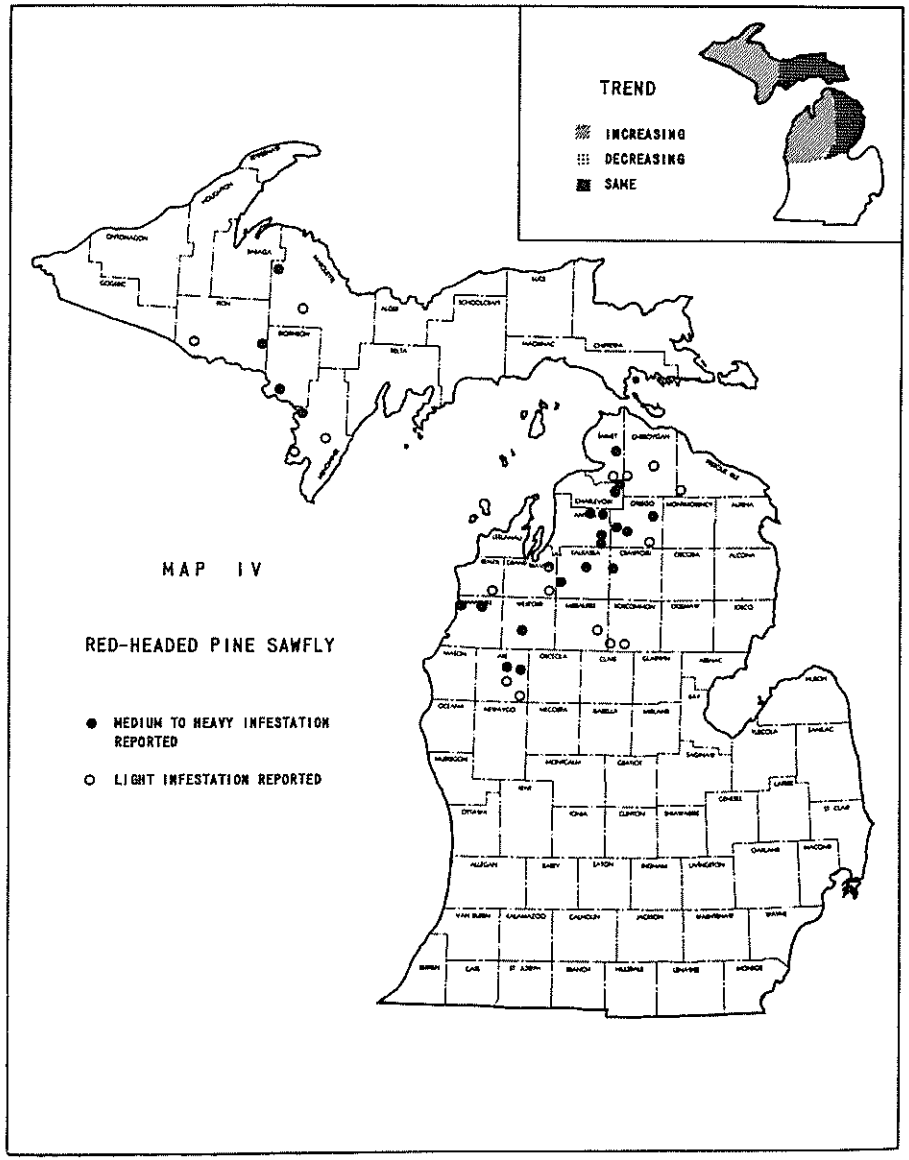
Heavy defoliation.....(61-100%).....44.....(38.9%)
Medium defoliation.....(21-60%).....22.....(19.5%)
Light defoliation.....(1-20%).....47.....(41.6%)

The larch sawfly continues to increase in the Upper Peninsula and northern half of the Lower Peninsula. The rate of spread has not been as rapid as in the previous two years. However, the intensity of defoliation in the infested stands has increased. Defoliation remains severe in the western Upper Peninsula with over 75 percent of the needles eaten in some stands. No tree mortality due to the current sawfly outbreak has been reported. (See Map V).

SARATOGA SPITTLEBUG - *Aphrophora saratogensis* (Fitch)

Summary of Reports

	1951	1952	1953	1954	1955	1956	1957
Total.....	17	51	164	211	229	225	214
Percent Positive.....	88	27	34	23	28	27	30


TREND
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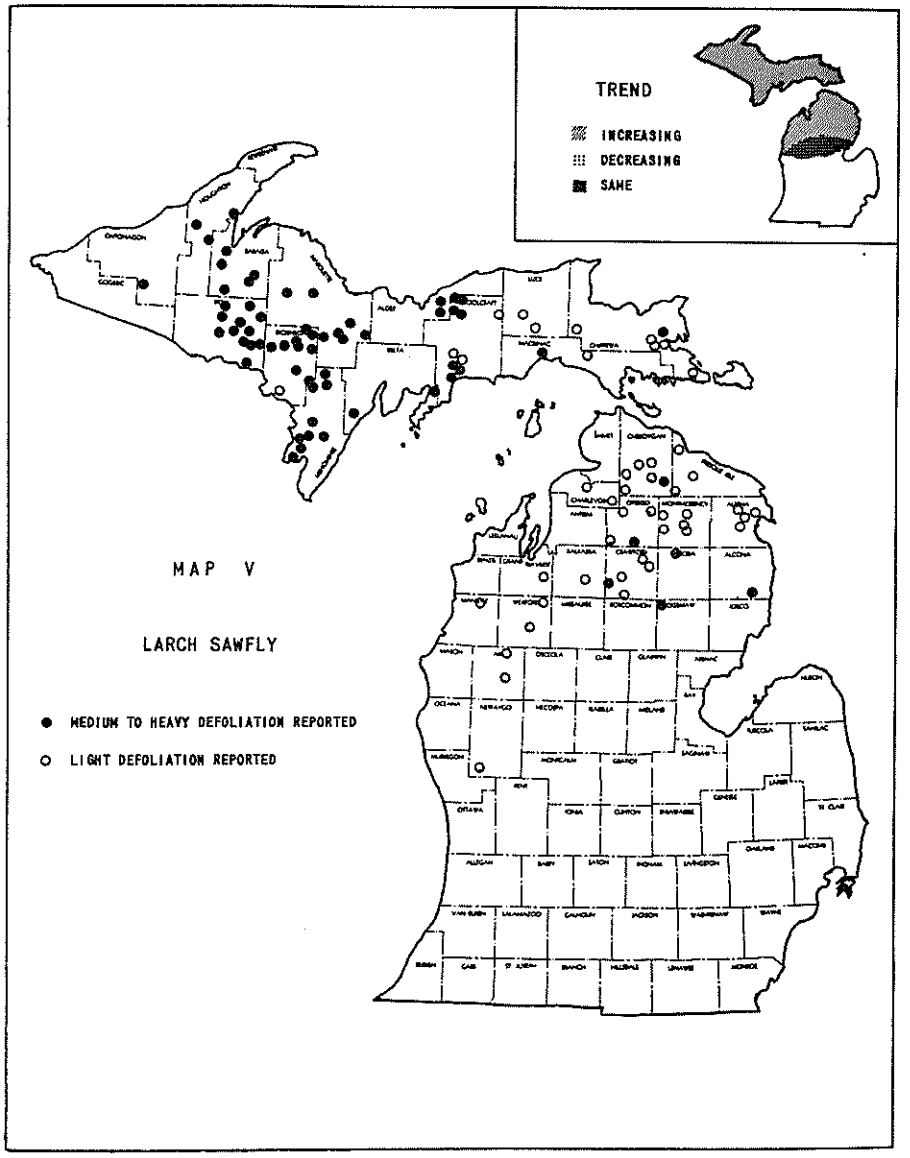
MAP IV
RED-HEADED PINE SAWFLY
MEDIUM TO HEAVY INFESTATION REPORTED
LIGHT INFESTATION REPORTED


TREND
INCREASING
DECREASING
SAME
MAP V
LARCH SAWFLY
MEDIUM TO HEAVY DEFOLIATION REPORTED
LIGHT DEFOLIATION REPORTED

Breakdown of 1957 Reports

Heavy injury.....(61-100%).....0.....(0.0%)
Medium injury,.....(21-60%).....0.....(0.0%)
Light injury.....(1-20%).....64.....(100.0%)

Population levels of the Saratoga spittlebug remained generally low as indicated by the absence of reports of moderate or heavy injury on state or private land. Heavy flagging was reported in Newaygo County by the U. S. Forest Service and indications are that an outbreak may be starting. (See Map VI).

WHITE PINE WEEVIL - *Pissodes strobi* (Peck)

Summary of Reports

	1951	1952	1953	1954	1955	1956	1957
Total.....	39	33	231	278	319	306	317
Percent Positive.....	82	64	65	59	60	53	56

Breakdown of 1957 Reports

Heavy injury.....(41-100% of leaders killed).....14.....(8.0%)
Medium injury.....(11-40% of leaders killed).....32.....(18.2%)
Light injury.....(1-10% of leaders killed).....130.....(73.8%)

The white pine weevil continues to be the major pest of young white and jack pine. Populations remained at a moderate level in the Upper Peninsula and high level in the Lower Peninsula. Jack, white and Scotch pines are the preferred hosts although weeviling of red pine is increasing. Weeviling of red pine was reported in 8 counties in 1957 as compared to 3 counties in 1956.

Weeviling of over 40 percent in some jack pine plantations was reported in Chippewa County in the Upper Peninsula and Emmet, Cheboygan, Charlevoix, Kalkaska, Benzie, Allegan and Van Buren counties in the Lower Peninsula.

The weevil remains absent in the extreme southeastern section of the Lower Peninsula. (See Map VII).

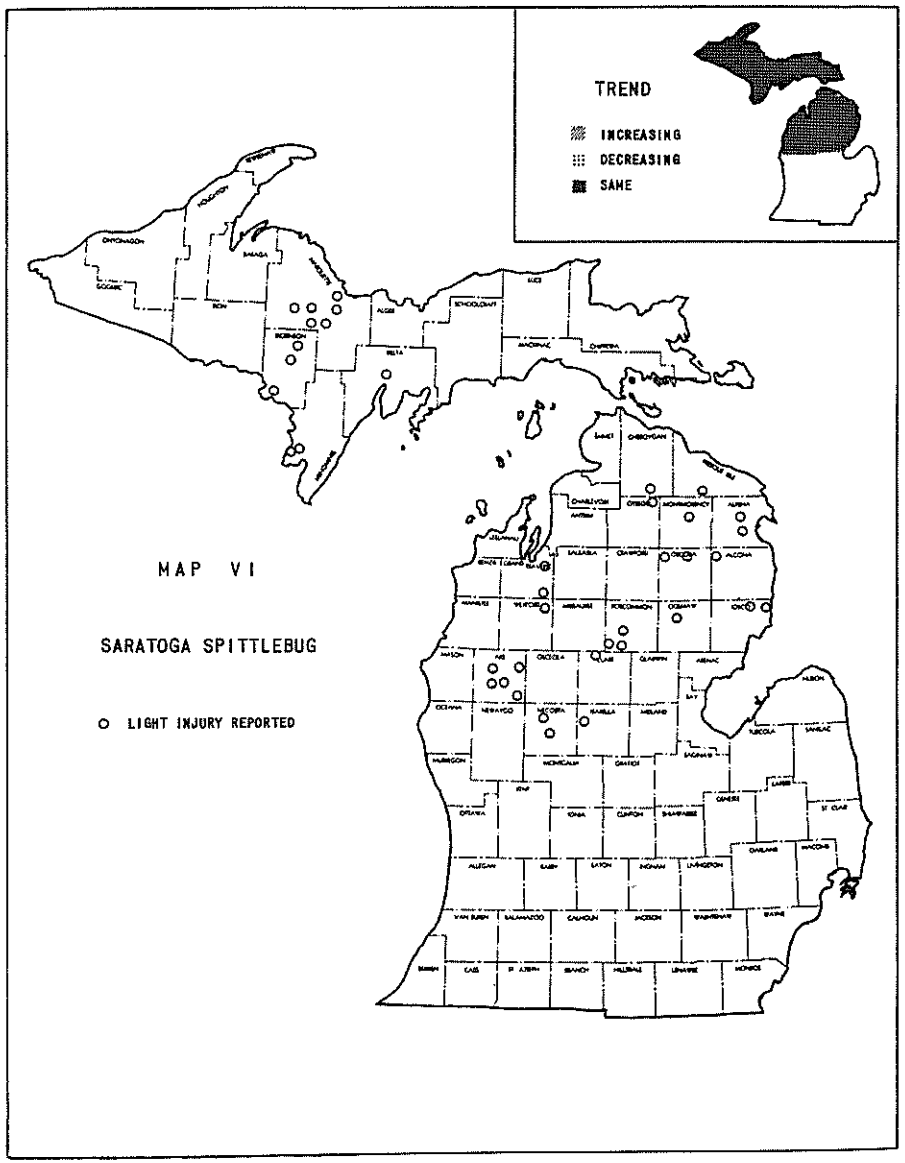
ANOMALA BEETLE or PINE CHAFER - *Anomala oblivia* Horn

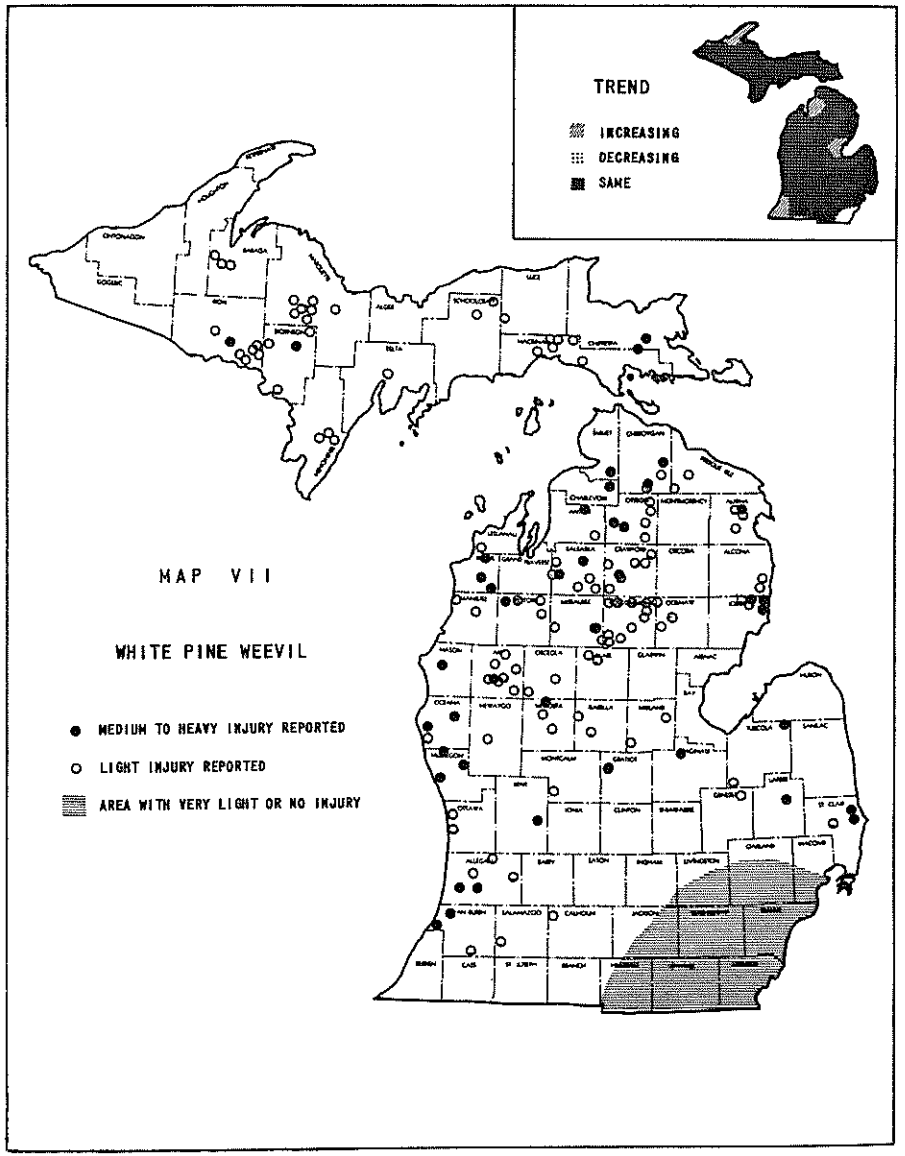
Summary of Reports

	1951	1952	1953	1954	1955	1956	1957
Total.....	119	181	236	278	275	271	269
Percent Positive.....	35	36	32	38	38	37	22

Breakdown of 1957 Reports

Heavy defoliation.....(61-100%).....0.....(0.0%)
Medium defoliation.....(21-60%).....4.....(6.9%)
Light defoliation.....(1-20%).....54.....(93.1%)


TREND
INCREASING
DECREASING
SAME
MAP VI
SARATOGA SPITTLEBUG
LIGHT INJURY REPORTED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DECREASING
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MAP VII
WHITE PINE WEEVIL
MEDIUM TO HEAVY INJURY REPORTED
LIGHT INJURY REPORTED
AREA WITH VERY LIGHT OR NO INJURY

Only light defoliation by the anomala beetle was reported in the Lower Peninsula with the exception of Kalkaska and Grand Traverse counties where some heavier feeding occurred. The over-all population level is declining. This pest has not caused much damage to forest trees but it is primarily a serious threat to Christmas trees.

It is not yet known to be present in the Upper Peninsula. (See Map VIII).

EUROPEAN PINE SHOOT MOTH - *Rhyacionia bouliana* (Schiff.)

Summary of Reports

	1951	1952	1953	1954	1955	1956	1957
Total.....	44	80	119*	203	207	258	288
Percent Positive.....	80	40	47	39	49	42	41

* INCREASE DUE TO INCLUSION OF INSECT ON CRITICAL LIST OF DISTRICTS IN NORTHERN HALF OF LOWER PENINSULA.

Breakdown of 1957 Reports

* Heavy injury.....48.....(41.0%)
* Medium injury.....7.....(6.0%)
* Light injury.....62.....(53.0%)

* Degree of injury = "I" = $\frac{\%\text{ of susceptible trees attacked} \times \%\text{ of tips infested}}{100}$

Heavy if "I" is greater than 20
Medium if "I" is between 10 and 20
Light if "I" is less than 10

The European pine shoot moth, the most serious and difficult to control pest of red pine, continued to spread in Michigan. It can be found in almost all counties in the Lower Peninsula and in Houghton, Mackinac, Schoolcraft and Luce counties in the Upper Peninsula. The shoot moth is causing severe distortion of red and Scotch pine in many of these areas.

Natural red pine is injured as well as plantation trees. (See Map IX).

EUROPEAN PINE SAWFLY - *Neodiprion sertifer* (Geoff.)

Summary of Reports

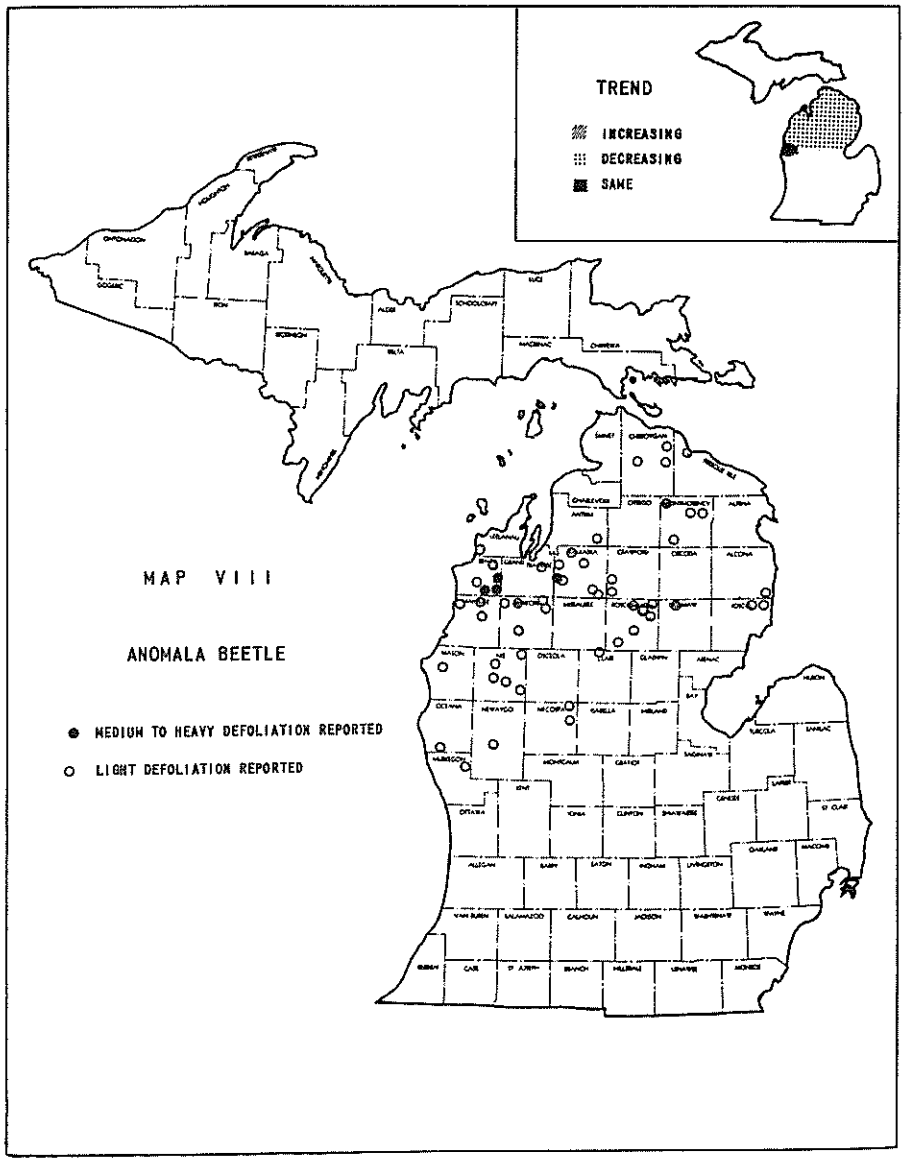
	1951	1952	1953	1954	1955	1956	1957
Total.....	31	64	85	82	111	100	104
Percent Positive.....	87	69	74	75	74	62	56

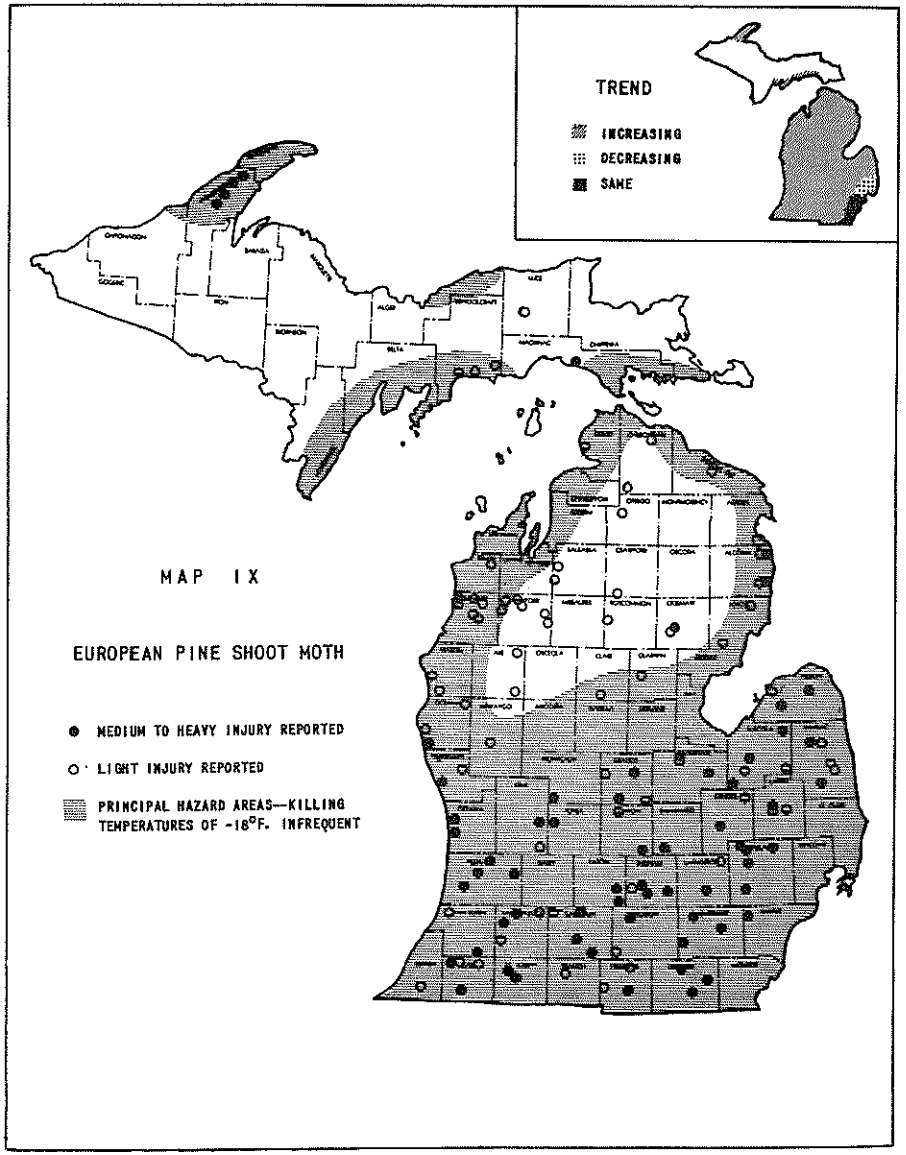
Breakdown of 1957 Reports

* Heavy defoliation.....5.....(8.6%)
* Medium defoliation.....3.....(5.2%)
* Light defoliation.....50.....(86.2%)

* Degree of defoliation = "D" = $\frac{\%\text{ of susceptible trees attacked} \times \%\text{ of defoliation}}{100}$

Heavy if "D" is greater than 24
Medium if "D" is between 9 and 24
Light if "D" is less than 9


TREND
INCREASING
DECREASING
SAME
MAP VIII
ANOMALA BEETLE
MEDIUM TO HEAVY DEFOLIATION REPORTED
LIGHT DEFOLIATION REPORTED


TREND
INCREASING
DECREASING
SAME
MAP IX
EUROPEAN PINE SHOOT MOTH
MEDIUM TO HEAVY INJURY REPORTED
LIGHT INJURY REPORTED
PRINCIPAL HAZARD AREAS—KILLING TEMPERATURES OF -18°F. INFREQUENT

In the southern part of the Lower Peninsula the European pine sawfly is the most important defoliator of hard pines. The feeding early in the year generally does not cause the trees to die, but does reduce the growth. This insect is important to the Christmas tree growers as it consumes all the old needles.

The sawfly appears to be increasing in the southeastern counties, decreasing in the southwestern counties, and remaining the same in the south central counties.

Moderate to heavy defoliation was reported from Huron, Saginaw, Lapeer, Eaton, Ingham, Washtenaw and Lenawee counties, all in the southern part of the Lower Peninsula. (See Map X).

FOREST TENT CATERPILLAR - *Malacosoma disstria* Hbn.

Summary of Reports

	1954	1955	1956	1957
Total.....	117	120	111	114
Percent Positive.....	23	17	5	4

Breakdown of 1957 Reports

Heavy defoliation.....(61-100%).....0.....(0.0%)
Medium defoliation.....(21-60%).....1.....(25.0%)
Light defoliation.....(1-20%).....3.....(75.0%)

The forest tent caterpillar infestation in Gogebic County south of US-2 remained about the same as in 1956. Large aspen tortrix larvae feeding in the same stands add to the situation as the defoliation is the total feeding of the two species. Elsewhere in Michigan the forest tent caterpillar has almost disappeared.

Parasitism is increasing in Gogebic County and the infestation should soon collapse. (See Map II).

SPRUCE BUDWORM - *Choristoneura fumiferana* (Clem.)

Summary of Reports

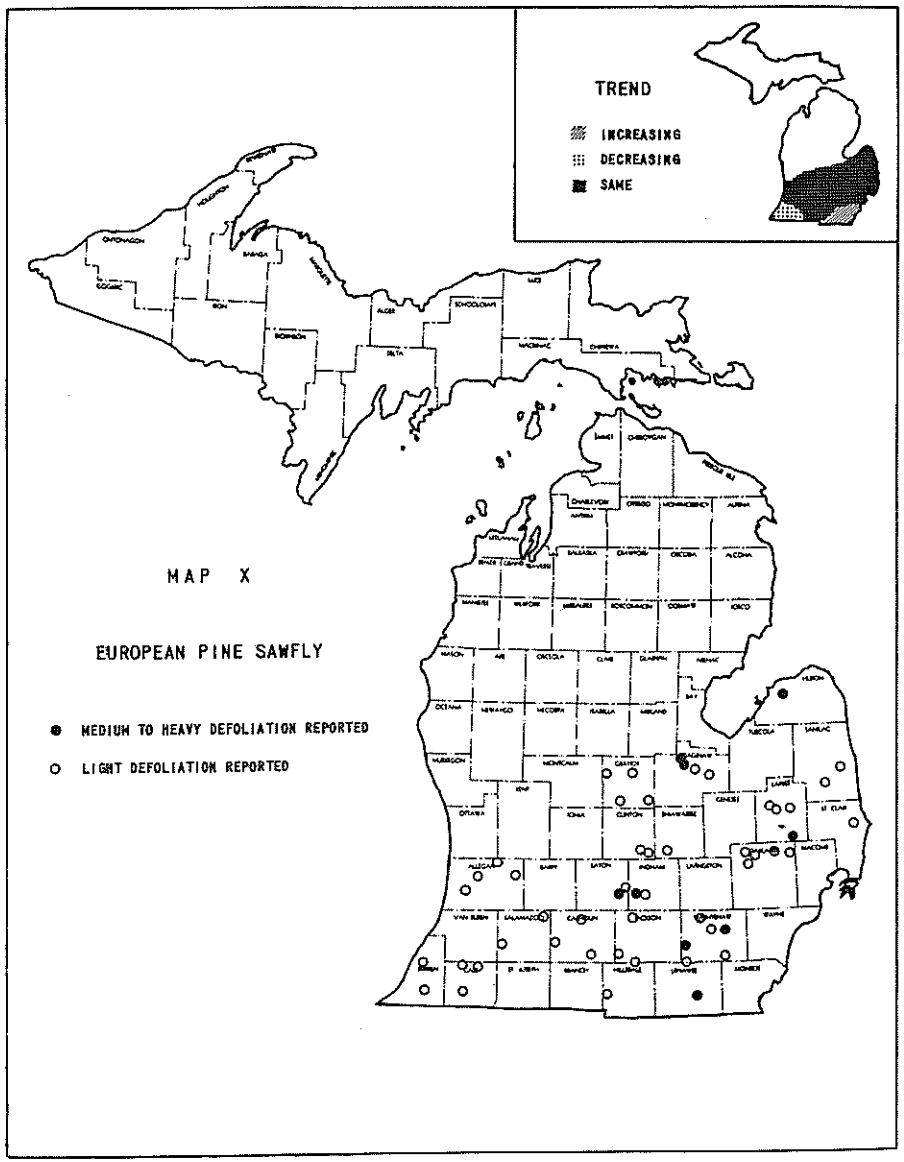
	1956	1957
Total.....	40	29
Percent Positive.....	2	3

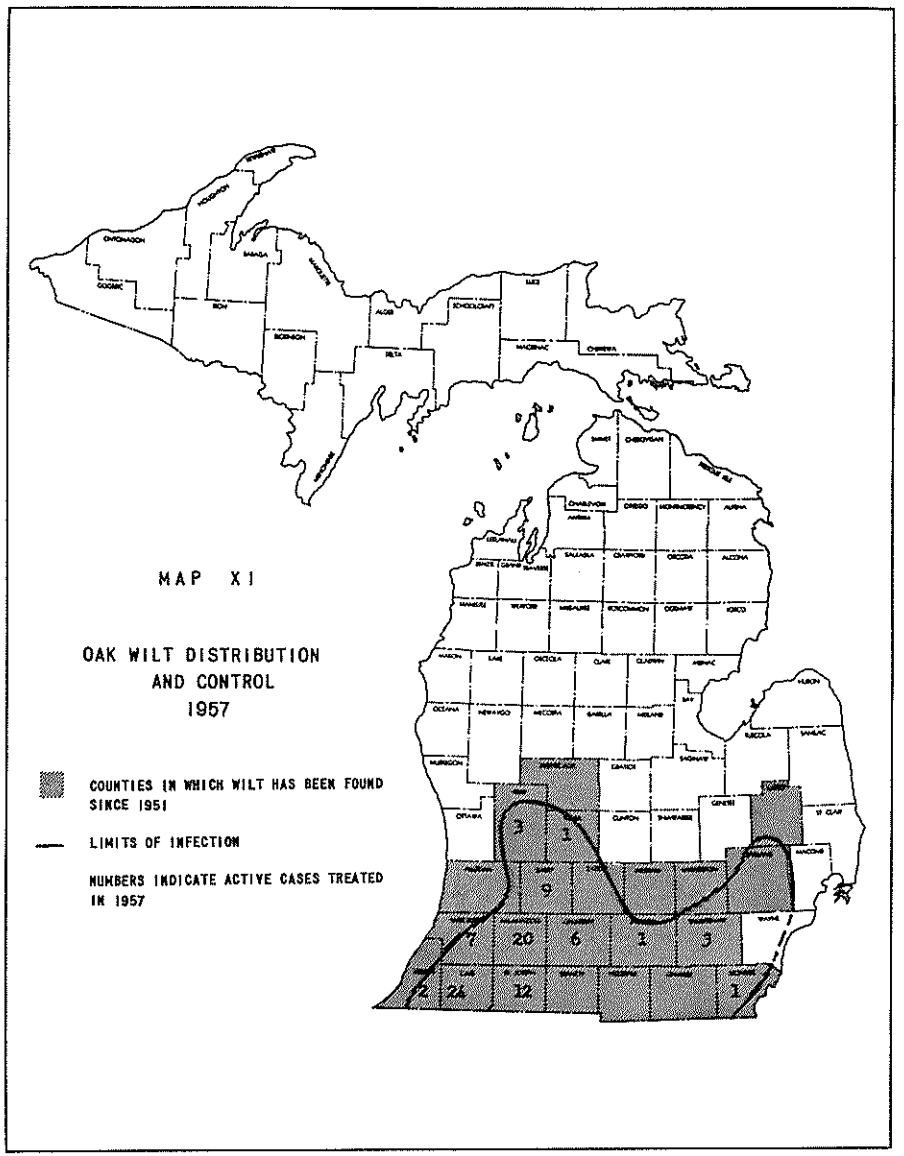
Breakdown of 1957 Reports

Heavy defoliation (61-100%).....0.....(0%)
Medium defoliation (21-100%).....0.....(0%)
Light defoliation (1-20%).....1.....(100%)

No new areas of spruce budworm outbreaks were found in Michigan. The population in Keweenaw County remained at a low level. Throughout the rest of the Upper Peninsula a few larvae could be found, but no noticeable defoliation has been reported.

The scattered occurrence and variation in size, age, stocking and mixtures of the balsam stands make the probability of a widespread outbreak fairly remote.


TREND
INCREASING
DECREASING
SAME
MAP X
EUROPEAN PINE SAWFLY
MEDIUM TO HEAVY DEFOLIATION REPORTED
LIGHT DEFOLIATION REPORTED


MAP XI
OAK WILT DISTRIBUTION
AND CONTROL
1957
COUNTIES IN WHICH WILT HAS BEEN FOUND SINCE 1951
LIMITS OF INFECTION
NUMBERS INDICATE ACTIVE CASES TREATED IN 1957
3
3
9
7
20
6
1
3
2
24
12
1

OTHER IMPORTANT INSECTS

GYPSY MOTH - *Porthetria dispar* (L.)

The following information on the gypsy moth was received from the Division of Plant Industry, Michigan Department of Agriculture, and is a summary of their work on the gypsy moth during 1956.

"The aerial spraying phase of the 1957 Gypsy Moth eradication program commenced on May the 5th. Due to unceasing winds and extensive rainfall the job was not completed until the twenty-third.

"The original contract called for aerially spraying of 7,573 gallons of a 12½% DDT solution applied at the rate of one gallon per acre. After operations were well under way a reappraisal was made of the amount of wooded acres to be sprayed and the final gallonage applied amounted to 11,025. Of the 18,880 acres treated, 17,280 were on private lands and 1,600 on state lands. In addition to the 18,880 acres treated to eradicate the Gypsy Moth, the contractor also applied the same material at the same dosage and rate of application over local subdivisions and communities for the relief of mosquitos. The total area treated amounted to 11,238 acres, and it is felt that this should also be included as Gypsy Moth control spraying. The total acreage sprayed with a 12½% DDT solution would then total 30,118.

"The trapping phase began on the 17th of June and was conducted in the following central Michigan counties: Gratiot, Ionia, Clinton, Shiawassee, Barry, Eaton, Ingham, Livingston, Calhoun, Jackson, and Washtenaw. The current survey was conducted by placing 4,911 traps over an area of 1,977 square miles. An average of 80 square miles was covered by each trap tender. About 200 traps were placed in each of the trap tender's district. These were patrolled at least once each week and new traps were placed when necessary. For the first time since the infestations were found in Michigan no moths were recovered. It is interesting to note that not a single moth has been caught in any of the areas that were aerially treated since 1954. If the next two years are as successful as the year 1957, it will be relatively safe to assume that the Gypsy Moth has been eradicated in Michigan."

INTRODUCED PINE SAWFLY - *Diprion similis* (Htg.)

Introduced pine sawfly larvae were found in Michigan for the first time this year. Small infestations were discovered in Antrim, Charlevoix and Kalamazoo counties.

RED-HUMPED OAKWORM - *Symnerista albiscosta* (Hbn.)

The red-humped oakworm stripped oak on 44,800 acres in Oceana, Lake, Newaygo and Muskegon counties in the Lower Peninsula. This pest is mainly an annoyance to the residents of the infested area and is expected to disappear without having much effect on the trees.

LARGE ASPEN TORTRIX - *Archips conflictana* (Wlk.)

Large aspen tortrix defoliation occurred throughout much of the Upper Peninsula, in some places eating 75 percent or more of the leaves. Heaviest defoliation occurred in Chippewa, Mackinac, Ontonagon, Iron and Gogebic counties. In Gogebic County some stands were defoliated by a combination of the large aspen tortrix and the forest tent caterpillar.

FRUIT TREE LEAF ROLLER - *Archips argyrospila* (Wlk.)

The fruit tree leaf roller defoliated oak on 350,000 acres in the central Lower Peninsula counties of Crawford, Roscommon, Ogemaw and Oscoda. Some branch and tree mortality is occurring

in stands after two years of defoliation. It is assumed that this is not primarily due to the insect but to a combination of factors. Heavy parasitism found in the older portions of the infestation should cause the population level to sharply decline in 1958.

ZIMMERMAN PINE MOTH - *Dioryctria Zimmerman* (Grote)

The Zimmerman pine moth has been responsible for deforming pole size red pine on 3,800 acres in Wexford County in the Lower Peninsula. Repeated killing of part of the new growth has resulted in bushy, distorted trees.

PINE ROOT COLLAR WEEVIL - *Hylobius radicus* Buch.

Injury due to the pine root collar weevil was generally confined to roadside windbreaks. No cases of serious damage in plantations have been reported.

BIRCH LEAF SKELETONIZER - *Bucculatrix canadensisello* Chamb.

Birch leaf skeletonizer defoliation was more prevalent in the Upper Peninsula and northern Lower Peninsula than it has been for several years.

WALKINGSTICK - *Diapheromera femorata* (Say)

This being an off-year for the walkingstock, no defoliation was noted except in Dickinson County. In this area there is a small infestation that occurs in the odd years.

RED PINE CONE BEETLE - *Conophthorus resinosae* Hopkins

An area of sapling and pole-sized red pine along the west side of Keweenaw County was severely attacked by cone beetles killing the new shoots.

LARCH CASEBEARER - *Coleophora laricella* (Hbn.)

The larch casebearer can be found in most larch stands but no noticeable defoliation was found.

JACK PINE SAWFLY - *Neodiprion pratti banksianae* Roh.

The jack pine sawfly was again responsible for defoliating a 40-acre stand of jack pine in Roscommon County in the Lower Peninsula.

* * *

DISEASES

OAK WILT

Oak wilt disease was first confirmed in Michigan in 1951, although there is evidence to show that it had been present in the state for several years prior to that time. Annual surveys since 1951 have located the disease in 22 southern Michigan counties, with the greatest concentration in the southwestern area. In spite of its persistence over the years, the disease has spread rather slowly, a fact which lends considerable hope to the control program.

Two Conservation Department planes were used in the 1957 aerial survey in which six heavily infected southwestern counties were covered at one mile intervals, and all known locations in

other counties were spot-checked. The intensively flown counties were Barry, Calhoun, Cass, Kalamazoo, Kent, St. Joseph and VanBuren. Flying was done between July 1 and July 18. In addition Cass County was reflown on August 20. Flying time for the season totaled 84.2 hours at a cost of $620.37 for planes and pilots.

Suspected wilt spots located from the air as well as old known locations were checked on the ground by Conservation Department district foresters and State Department of Agriculture field inspectors to determine the presence or absence of active wilt. Wilt was found in an active condition at a total of 95 locations, including 65 new spots and 30 old ones. This brings the total known locations, active and inactive, to 352.

A full-scale control program was undertaken by the State Department of Agriculture for the second year. Encouraged by the results of the previous year the same technique was followed, except that 2,4-D ester was used instead of 2,4-D amine. The treatment includes the axe-girdling of the infected trees plus those healthy oaks within root range of the infected ones. The chemical is applied to the girdles to hasten the death of the trees and prevent sprouting. This treatment is designed to prevent spore mat formation on the diseased tree, and to break the underground link to adjoining trees by preventing spread through root grafts. A total of 204 infected trees and 668 healthy surrounding trees were treated during the 1957 season. In 1956 there were 223 infected trees treated.

While many new wilt cases were found this year, the number was below previous years, and the recurrence of wilt at spots previously treated was encouragingly low. Thus it appears that some progress is being made. However, it may take perhaps three or four more years before a definite trend is established.

Map XI shows the range of oak wilt in the state and the number of areas treated in 1957 by counties.

DUTCH ELM DISEASE

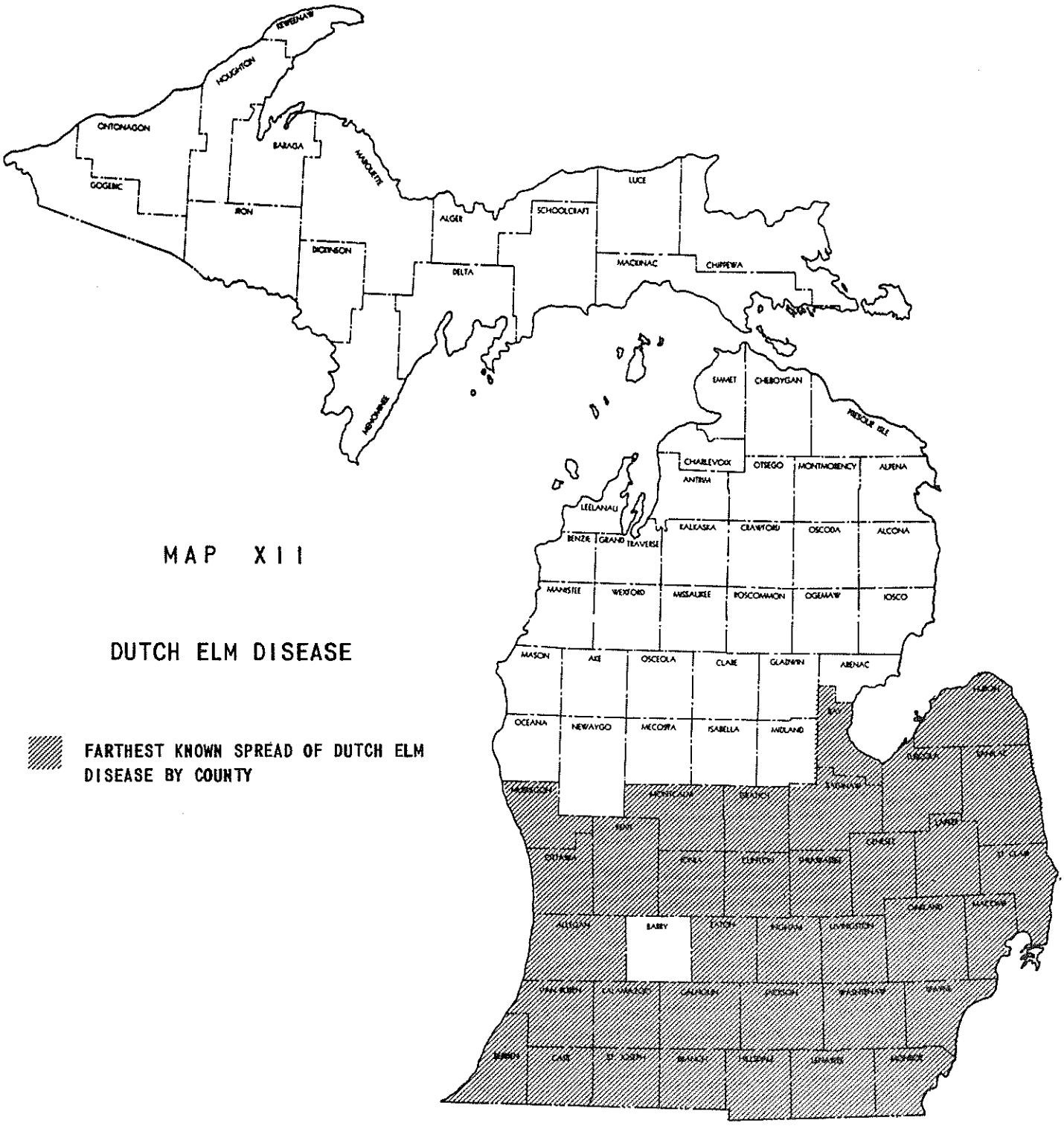
Dutch elm disease was discovered in the Detroit area in 1950, and has since spread across the southern part of the Lower Peninsula and as far north as Bay and Muskegon counties. (See Map XII).

A cooperative program of survey and control is coordinated by the State Department of Agriculture working with local units of government. This department is responsible for the survey and enforcement phase of the program, and the municipalities conduct the necessary sanitation and spraying. Laboratory facilities for diagnosing Dutch elm disease and oak wilt are maintained at Michigan State University; however, the laboratory will be permanently housed in the new State Department of Agriculture Chemical Control Laboratories building during the spring of 1958.

The following statement regarding the 1957 Dutch elm disease program was prepared by the Division of Plant Industry of the State Department of Agriculture.

"During the 1957 season the Dutch Elm Disease program continued on an intensified scale throughout almost all of the southern half of the Lower Peninsula in Michigan. Nearly every community in most counties was surveyed by the State or in some instances by their own forestry crews. As a result of this intensified program, new communities were found to be infected with the disease. While many more communities were surveyed this year than last, there was a slight decrease in the total number of diseased trees found.

"There were 9,168 samples submitted to the Dutch Elm Disease Laboratory for testing, of which 7,591 were positive. Thus, approximately 80 percent of all samples submitted were positive cases.


MAP XII
DUTCH ELM DISEASE
FARTHEST KNOWN SPREAD OF DUTCH ELM DISEASE BY COUNTY
ONTONAGON
HOUGHTON
BARAGA
MARQUETTE
GOGEBIC
IRON
DICKINSON
ALGER
SCHOOLCRAFT
DELTA
LUCE
MACKINAC
CHIPPEWA
MENOMINEE
EMMET
CHEBOYGAN
PRESQUE ISLE
CHARLEVOIX
OTSEGO
MONTMORENCY
ALPENA
ANTRIM
LEELANAU
BENZIE
GRAND TRAVERSE
KALKASKA
CRAWFORD
OSCODA
ALCONA
MANISTEE
WEXFORD
MISSAUKEE
ROSCOMMON
OGEMAW
IOSCO
MASON
LAKE
OSCEOLA
CLARE
GLADWIN
ARENAC
OCEANA
NEWAYGO
MECOSTA
ISABELLA
MIDLAND
BAY
MUSKEGON
MONTCALM
GRATIOT
SAGINAW
OTTAWA
KENT
IONIA
CLINTON
SHIAWASSEE
GENESEE
ALLEGAN
BARRY
EATON
INGHAM
LIVINGSTON
VAN BUREN
KALAMAZOO
CALHOUN
JACKSON
WASHTENAW
BERRIEN
CASS
ST. JOSEPH
BRANCH
HILLSDALE
LENAWEE
MONROE

"While the survey portion of this program was enlarged, the sanitation part was also intensified. Along with the regular survey and sampling, all trees in a dead or dying condition were ordered to be removed and destroyed just as diseased trees were. As a result there were 7,745 dead trees and 532 woodpiles condemned."

WHITE PINE BLISTER RUST

A detailed report of the white pine blister rust situation and control program is prepared annually by the Area Leader for this cooperative federal-state project. A brief summary of this report for 1957 follows:

"By the end of 1957, there were 464,710 acres of white pine and 1,283,207 acres of control area on record in Michigan. Over 9,000 acres of white pine were mapped and added to the control area during the year.

"Ribes eradication was done on 45,168 acres of control area to give protection to 22,612 acres of white pine. Eradication crews spent 4,065 man-days and destroyed 486,910 ribes bushes.

"The following table shows status of blister rust control by ownership classes.

ITEM	NATIONAL FORESTS	STATE	COUNTY-MUNICIPAL	PRIVATE	TOTAL
Acres White Pine.....	81,706	143,847	10,238	228,919	464,710
Acres Control Area.....	200,724	294,507	45,526	742,450	1,283,207
Percent Worked Initially.....	97.7	93.6	89.4	85.4	89.3
Percent on Maintenance.....	77.1	53.8	44.6	35.1	46.3
Acres Needing Initial Work.....	4,661	18,838	4,825	108,212	136,546
Acres Needing Rework.....	41,220	117,266	20,384	373,303	552,173

"A silvicultural pruning and canker removal job was done in a plantation on the Ottawa National Forest. A permit was given to a private concern to utilize the white pine boughs resulting from pruning and canker removal under Forest Service specifications and supervision. About 4,800 white pine were examined of which 450 were removed because of fatal infection and 630 were treated. About 1,900 blister rust cankers were removed.

"Ribes infection was about normal. Rust was fairly heavy in the Upper Peninsula and northern third of the Lower Peninsula. Infection in the remainder of the Lower Peninsula was light to locally heavy. Cankers of 1954 origin have now about all appeared. Small seedling white pine are turning color and dying from the 1954 infection."

* * *

SUMMARY

State, private and federal foresters submitted a total of 2,020 observation reports during the 1957 season. This is approximately the same number of reports as received in 1956. The total number of observation areas is now 689. The decrease of 39 areas for the 1956 total is a result of dropping of areas no longer suitable because of changed conditions or other reasons.

During 1957 the Conservation Department prepared and distributed new forest pest information leaflets on the anomala beetle, larch sawfly, mites or red spiders, jack pine budworm,

spruce budworm, forest tent caterpillar, eastern spruce gall aphid and eastern tent caterpillar, bringing to thirteen the total now available. Additional leaflets are to be prepared during 1958.

In April a Directory of Forest Tree Spraying Operators was compiled and published.

Special surveys were made for four insects. Most of the young plantations in the northeastern Lower Peninsula were surveyed to determine the extent of red-headed pine sawfly, white pine weevil, and European pine shoot moth infestation. Airplanes were used to map the defoliation caused by the fruit tree leaf roller and red-humped oakworm.

Control projects on state land were directed against the white pine weevil, red-headed pine sawfly, and European pine shoot moth. The U. S. Forest Service had control operations for the red-headed pine sawfly, Saratoga spittlebug and white pine blister rust. Under the supervision of the State Department of Agriculture control operations were directed against the gypsy moth, oak wilt, and Dutch elm disease. Plantation owners were concerned with control of the European pine shoot moth, pine sawflies, white pine weevil and anomala beetle.

Jack pine budworm populations remained about the same as in 1957, although there was a slight increase in heavy defoliation.

Red-headed pine sawfly populations increased greatly during 1957, particularly in the western Upper Peninsula and northwestern Lower Peninsula.

Larch sawfly continues to increase in the Upper Peninsula and northern half of the Lower Peninsula, although the rate of spread has not been as rapid as in previous years.

Saratoga spittlebug populations remained generally low.

The white pine weevil continues to be the major pest of young white and jack pine. Weeviling of red pine is increasing.

Anomala beetle defoliation was generally light.

European pine shoot moth continues to be the most serious and difficult to control pest of red pine in Michigan. A new location of infestation was found in Luce County in the Upper Peninsula.

European pine sawfly defoliation increased in some sections, decreased in others, but overall remained about the same.

Forest tent caterpillar and large aspen tortrix defoliated aspen in western Gogebic County.

Spraying for gypsy moth covered 30,118 acres in 1957. No moths were found in the trapping program following spraying.

Areas of oak in west central Lower Peninsula were defoliated by the red-humped oakworm and in north central Lower Peninsula by the fruit tree leaf roller.

Aerial survey for oak wilt in six heavily infected counties in southwestern Lower Peninsula and all known locations detected 65 new spots and 30 active old ones. Control results by girdling and chemically killing infected and surrounding trees have been encouraging. The Dutch elm disease program continued on an intensified scale throughout most of the southern half of the Lower Peninsula. While many more communities were surveyed than in 1956, there was a slight decrease in total number of diseased trees found.

Ribes eradication was done on 45,168 acres of control area to give protection to white pine from the white pine blister rust on 22,612 acres.